

keeping

CURRENT

November 1999

Reliability and the future of transmission costs

The reliability of a transmission system is determined by the actions taken to accommodate demand for power. Bonneville Power Administration's Transmission Business Line has made a major effort to cut costs in the last six years while still retaining the highest standards of reliability. However, even though TBL has tried to be as efficient as possible, it now is looking at increases in costs for both construction and annual expenses.

TBL is asking customers and constituents in November for their thoughts about planned capital spending and the expenses associated with supporting a reliable and safe Northwest transmission system. TBL plans to hold workshops to discuss the level of reliability that it is planning for and how much that level of reliability is expected to cost. The workshops will explore customer and constituent views on:

- Maintaining system reliability at a level commensurate with national and regional guidelines;
- Meeting local growth;
- Improving areas where transmission constraints diminish the ability of market participants to move their power through TBL's transmission system;
- Continuing to upgrade BPA's communications system by installing a fiber optic infrastructure;
- Replacing aging electrical equipment; and
- Addressing an aging workforce and the need to attract new, skilled employees.

These workshops, while not a part of the transmission rate case, will inform the FY 2002 to 2003 rates. The 2002 transmission rate case begins with an initial proposal in March.



HISTORY

In the late 1980s, public pressure led BPA to rethink how it will provide transmission capacity in the future. In response to rapid growth in Puget Sound, BPA looked at the traditional solution — more transmission lines across the Cascade Mountains. Due to public pressure against this alternative, BPA looked at other ways to meet load growth. Local power generation, demand side management and lower cost transmission alternatives were investigated. Ultimately BPA installed electrical equipment in substations around Seattle and Portland to strengthen the entire electrical system. It also added a substation in the Cascades, thus wringing more capacity from existing transmission and generating systems. Finding the least cost, least impact alternative to solve reliability or load service problems is part of TBL's mission.

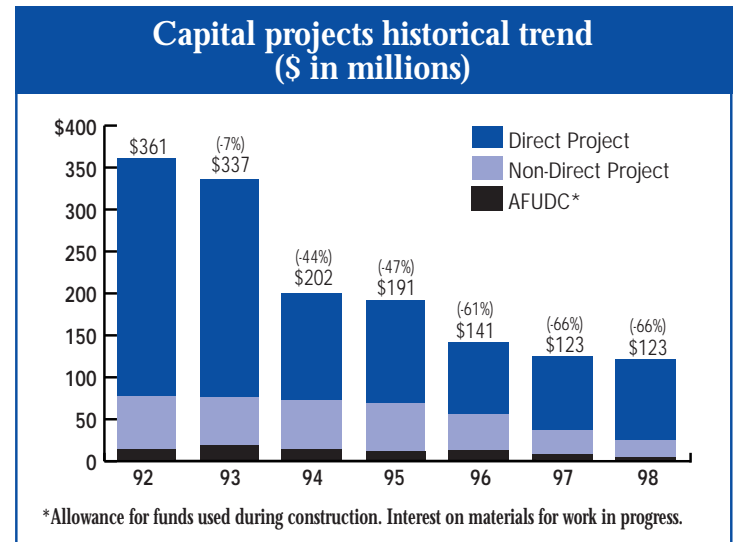
The National Energy Policy Act of 1992 brought to the Northwest increased competition for wholesale electricity markets and a significant increase in demand on the transmission system. For TBL, the clash between significant increases in customer demand and customer desires to keep costs down brought pressure from two directions. On the one hand, TBL saw new and sometimes startling changes in the use of the transmission system. On the other hand, it had to cut costs.

With 80 percent of Northwest high voltage transmission capacity and over 15,000 miles of line covering a 300,000 square mile area, BPA saw the need to focus more clearly on giving the public and customers what they want at the right price. Rather than continue to develop and expand the system, BPA stepped up its use of innovative technologies and techniques for its operation and maintenance.

As a result, fewer lines and substations have been built since 1993. That has had a profound effect on expenditures. Borrowing for capital — that is large, long-lasting projects — declined 66 percent from \$361 million in 1992 to \$123 million in 1998. Borrowing for main grid projects dropped even more, by 84 percent.

The need to be a low-cost provider in an increasingly competitive marketplace drove TBL to reduce such expenditures as maintenance costs, staffing and overhead. The number of staff dropped 36 percent, from 2,598 to 1,665 employees, and management was flattened, with the number of managers and supervisors declining by 55 percent.

Layers of management were cut from five to three. Support staff fell 21 percent. Operations and maintenance staff dropped as much as 37 percent.



Some costs did rise. BPA increased spending on fiber optic capacity to begin replacing its outdated analog microwave communications system, but is doing so in such a way that much of the cost of installing fiber will be offset by leasing excess dark fiber to communications companies and rural communities.

WHY TBL CAPITAL COSTS ARE RISING

Today, many parts of the transmission system are operating near capacity. That's due in part to load growth and in part to increased numbers of users of the system brought by competition. In Seattle alone, growth would consume the output of a 200-megawatt generator each year. And the fact that growth takes place miles away from major generators puts other strains on the transmission system. Also, competition has caused the number of transactions to increase from about 300 to more than 2,500 per day.

An additional pressure on the capital budget process is the push for more stringent adherence to reliability criteria. Due to heightened awareness of reliability issues, criteria from the North American Electric Reliability Council and Western Systems Coordinating Council now are mandatory and include monetary sanctions for non-compliance. Multiple contingencies are now often driving project needs and operation of the system.

"We could only make the kinds of cuts we've made in the past six years for a finite period because there was

some margin in the system,” said Vickie VanZandt, vice president of transmission operations and planning. “Now that we’ve used up the margin we had built into the transmission system, we need to again begin reinforcement activities.”

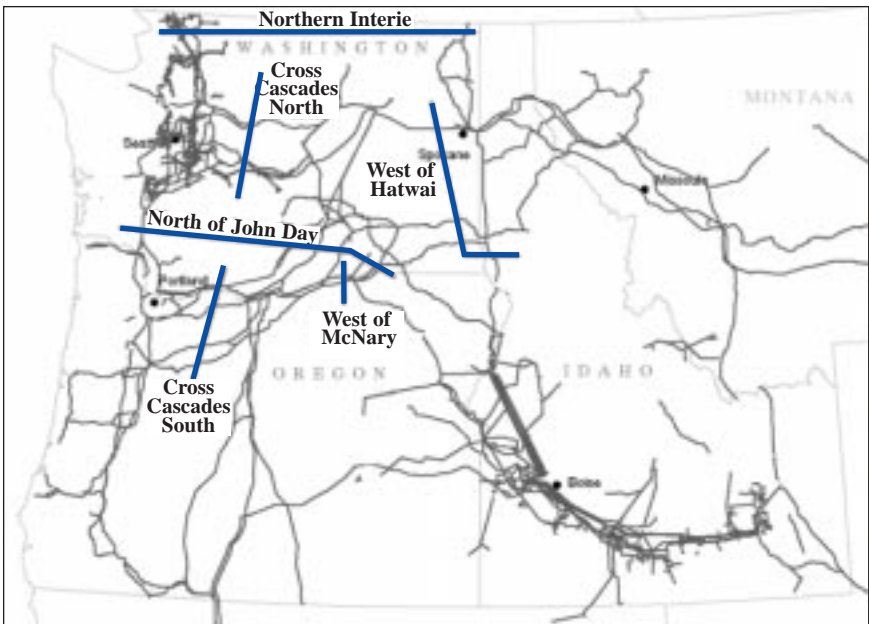
According to VanZandt, it is more difficult to run the transmission system now because the system is affected by a large number of complex transactions, generating patterns that differ day to day, and sometimes within the day, and by the way the river is operated. It’s no longer possible, she said, to dispatch hydroelectric generators as readily to bolster the system because of constraints on the river system aimed to help Columbia River salmon.

“Now that we’ve used up the margin we had built into the transmission system, we need to again begin reinforcement activities.” Vickie VanZandt, vice president, transmission operations and planning.

Also, there are some areas of congestion where the demand for power exceeds the transmission system’s capacity. “Sometimes people experience curtailments in these areas, and that doesn’t make them happy,” Van Zandt said. “We’ve put off investments now as long as it’s prudent.”

Specifically, those congested areas (see map) include routes across the Cascade Mountains, West of Hatwai, from the Puget Sound area into Canada, West of McNary and North of John Day. Work in these areas will put upward pressure on TBL’s capital costs.

NW Constrained Paths



Work in congested areas will put upward pressure on TBL’s capital costs.

Major capital projects include:

- East Seattle reinforcement and North Seattle transformer will improve reliability in Puget Sound, as well as transfers into Canada.
- Series capacitors at Schultz Substation will improve reliability across the Cascade Mountains and in Puget Sound, as well as transfers into Canada.
- McNary-Slatt 500 kV line will accommodate new generation in the Hermiston area.
- West of Hatwai fixes will improve transfers from Montana.
- Northern Intertie fixes will improve transfers into Canada.
- Fiber optic installation will upgrade and improve TBL communications systems and operational reliability.

WHY FIBER IS IMPORTANT TO RELIABILITY AND NORTHWEST DEVELOPMENT

Fiber optic installations are continuing at TBL. Fiber is used for BPA’s internal communications needs to operate the Northwest transmission grid and is replacing TBL’s outdated analog microwave radio system. The use of fiber is improving TBL’s ability to provide reliable transmission services.

It is placed on existing structures using existing right-of-ways. According to Ruth Bennett, TBL sales manager, there is little cost difference between installing only the fiber capacity TBL needs in the near term to operate its system and the additional capacity installed to lease excess to communications companies and others.

“We’re making excess dark fiber available for use by others and are leasing it to them at market rates,” Bennett said. “This is a revenue-producing enterprise, something that pays back within five years.” Dark fiber is unlit fiber. Companies who lease excess capacity must install terminal equipment at either end of the fiber cables to use it.

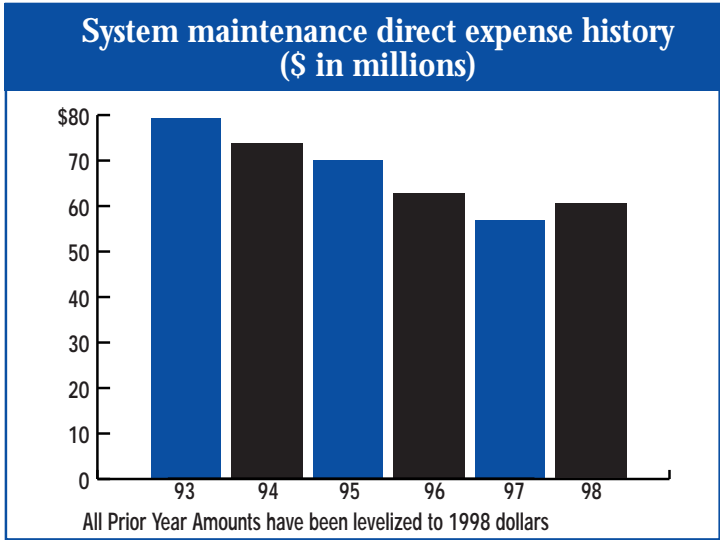
She said TBL is also leasing excess fiber capacity for public benefits reasons. TBL makes excess fiber capacity available to rural communities.

“These are areas where commercial fiber may be unavailable because of lack of population density and the expense to reach these communities,” Bennett said. “But our fiber is already there, so we can provide fiber to rural areas that need it for schools and emergency services and make those communities more attractive for economic development.”

WHY EXPENSES ARE GOING UP

“Over the past six years, we’ve reduced our labor force by about 30 percent,” said Fred Johnson, vice president of transmission field services. “We did that through a number of measures, such as developing a methodology called ‘minimum crew size’ to meet the needs of basic maintenance, flattening the organization and reducing the level of management.”

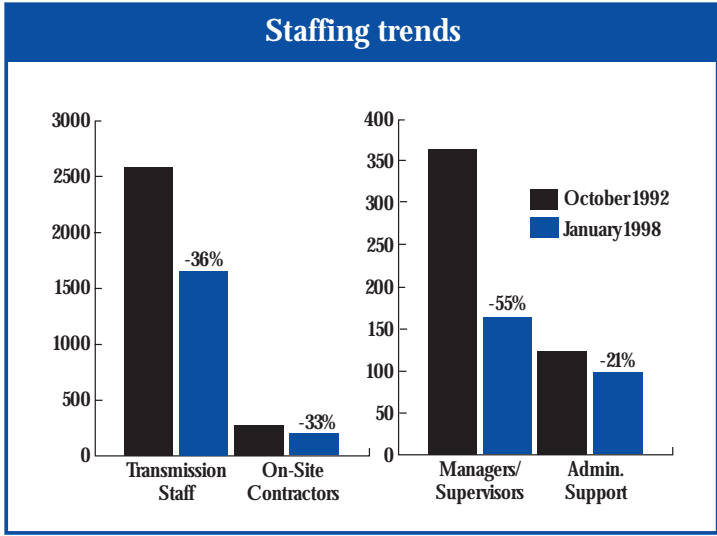
TBL also reduced labor costs through a change in maintenance philosophy, from the typical planned preventive maintenance system where maintenance is performed whether it’s needed or not, to a reliability-centered maintenance philosophy that looks at how critical a piece of equipment is and at indicators that tell when that equipment could fail.



“Planned maintenance can be intrusive,” Johnson said. “Now, we maintain it before it fails, but only when it’s needed. Availability increases and reliability remains high.”

BPA also doubled tree-trimming expenditures with a result of a dramatic drop in tree-caused outages. With all these changes, the cost of maintaining the system dropped by \$22 million, from \$80 million in 1992 to \$58 million

in 1997. These savings were realized in spite of the decrease in capital expenditures over the same time that typically would result in increased maintenance costs.



However, when TBL was downsizing, it wasn’t able to replace all the skilled labor it was losing. Complicating this is that in the near future, nearly one-half of the TBL labor force will be eligible for full or early retirement.

“We are going to have to look at whether we have gone too far in decreasing our labor force,” Johnson said. “Also, we need to look at how to begin our succession planning so that in the future we have as well-trained a labor force as we do now.”

Succession planning includes such things as replacing the highly skilled employees that will leave TBL in the next five years and increasing the size of the apprentice program. TBL has already seen an increase from 20 to 53 apprentices in the past year. An apprenticeship takes four years and costs nearly \$100,000 per year per employee. In the end, Johnson said, “we have a highly trained workforce.”

Other items that are driving increases in TBL’s expense budget are:

- **Civil Service Retirement System.** BPA is required by the Office of Management and Budget to fully fund its pension program. OMB allowed BPA to delay paying some of the costs of the current 1996 to 2001 rate period into the next rate period. Therefore, the rate period 2002 to 2003 requires additional funding to accommodate catching up on its obligations. Costs are expected to drop in future periods.

- Cost shifts between business lines. These are costs that weren't accounted for before TBL separated from the Power Business Line. They are primarily the cost of generating inputs for ancillary services, such as paying the PBL for generator-supplied reactive power and spinning reserves.
- Scheduling, billing and marketing. This expense increase is due to a huge increase in the amount and complexity of transactions on the transmission system and the separation of TBL and PBL. TBL has created and must maintain a separate billing system, and a new scheduling system will be installed the next year. TBL also employs account executives to act as liaisons between TBL and its customers.
- The impact of inflation on personnel compensation, benefits and inflation. About 50 to 60 percent of TBL expenses are in personnel costs. TBL has about 1,700 employees, over half of whom are field employees spread out across 300,000 square miles and whose primary job is to keep the lights on.

ISSUES

TBL is considering several issues that affect planning, the level of capital spending and fairness in setting rates. It will discuss these issues with customers and constituents at public workshops in November.

Contract obligations vs. load forecast

When planning transmission system growth in the past, BPA relied on forecasts of growth in power needs. Today, in an effort to cut costs, some energy suppliers are not buying firm transmission service to cover their full peak load requirements, but instead are relying on short-term service to cover their peak load. The revenues from this short-term service are not sufficient to reinforce the system to meet the corresponding peak load. If the system is not reinforced and transmission shortages occur, all interconnected parties would be affected, including those that purchased long-term firm transmissions service.

BPA would like to see some mechanism in place where customers are more specific about the reliability they desire for their loads. Customers could continue to sign up for the reduced level of service, but in exchange they must offer TBL some protection if the system is in trouble. That

could mean giving TBL the ability to trip specific loads to relieve constraints. TBL is working with the Northwest Regional Transmission Association to help deal with this issue but would also like feedback in these workshops.

Marv Landauer, process manager for network planning, said, "This is also an equity issue for those who already pay for annual long-term firm service."

Transmission reactive charge

A portion of BPA's capital budget is used to install shunt capacitors on the system. These capacitors supply reactive power required by the transmission system. In some cases shunt capacitors are used to supply reactive power to uncompensated or under-compensated customer loads.

It is generally less expensive to install capacitors at load sites than on the main grid transmission system. BPA would prefer to have customers compensate their loads by installing required capacitors at their loads. This would result in lower costs to the ultimate consumer.

To encourage customers to install necessary capacitors at load sites rather than relying on the transmission system reactive capacity, BPA has a reactive power charge. However, some customers still depend on the main grid system to supply reactive power needs for their loads. BPA is looking for suggestions of how to reduce the reliance on the network to serve reactive needs at customer loads.

Locational pricing signals

Regional transmission organizations use pricing approaches to encourage generation and demand-side management to be located in a manner that uses transmission efficiently. If generation and DSM could be placed in very specific areas, such as in western Puget Sound, it could delay such expensive projects as a new transmission line across the Cascade Mountains. This concept was introduced in the original Puget Sound Area Reliability Study. However, because of the interconnected nature of the grid, parties have suggested that it is more appropriate for a regional transmission organization to apply this approach than BPA alone.

Landauer said TBL has looked at a number of locations to see what effects siting new generation would have on the transmission system. He said TBL is not ready to recommend pricing signals for two reasons. First, for the generation to be of value, it must be connected to specific locations on the transmission system and in finite amounts. Also, for every positive effect of building

locational generation there are often negative effects. In western Puget Sound, for example, the obvious positive effects for winter loads are offset by the difficulty of moving the new power out of the area in the summer.

RTO Formation

The proposed capital and expense spending reflects BPA continuing to plan, reinforce, and operate the transmission system as it has in the past. However, FERC is encouraging formation of regional transmission organizations and it is TBL's intent to participate in these regional discussions and if possible, join the RTO. If TBL were to join an RTO, it may no longer be responsible for the expenditures that are discussed above. But since the RTO formation may be several years away, TBL is continuing to ensure that the Bonneville system is safe and reliable.

TBL will seek input from customers and constituents at its public meetings.

TBL will take written comments on "Reliability and the Future of Transmission Costs" from Nov. 15 to Dec. 20, 1999. Send comments to: P.O. Box 12999, Portland, OR 97212 or e-mail to comment@bpa.gov. For questions on sending your comments, call: (503) 230-3478 (Portland) or 800-622-4519.

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WORKSHOPS TO DISCUSS
TRANSMISSION
RELIABILITY AND COSTS

TBL has scheduled five all-day workshops to brief customers and constituents on its budget items and issues that determine costs. Those workshops are:

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| November 15 | Tri-Cities |
| November 16 | Idaho Falls |
| November 22 | Seattle |
| November 23 | Spokane |
| November 30 | Portland |

To find out more about these workshops, including specific locations and times, please contact your transmission account executive or Linda Hunziker at (360) 418-8232 or e-mail llhunziker@bpa.gov. or check the web site at <http://www.transmission.bpa.gov>.



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